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Bulletin No. 76 - Forcing Lettuce

C. P. Close

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Forcing Lettuce.

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THE AGRICULTURAL EXPERIMENT STATION OF UTAH

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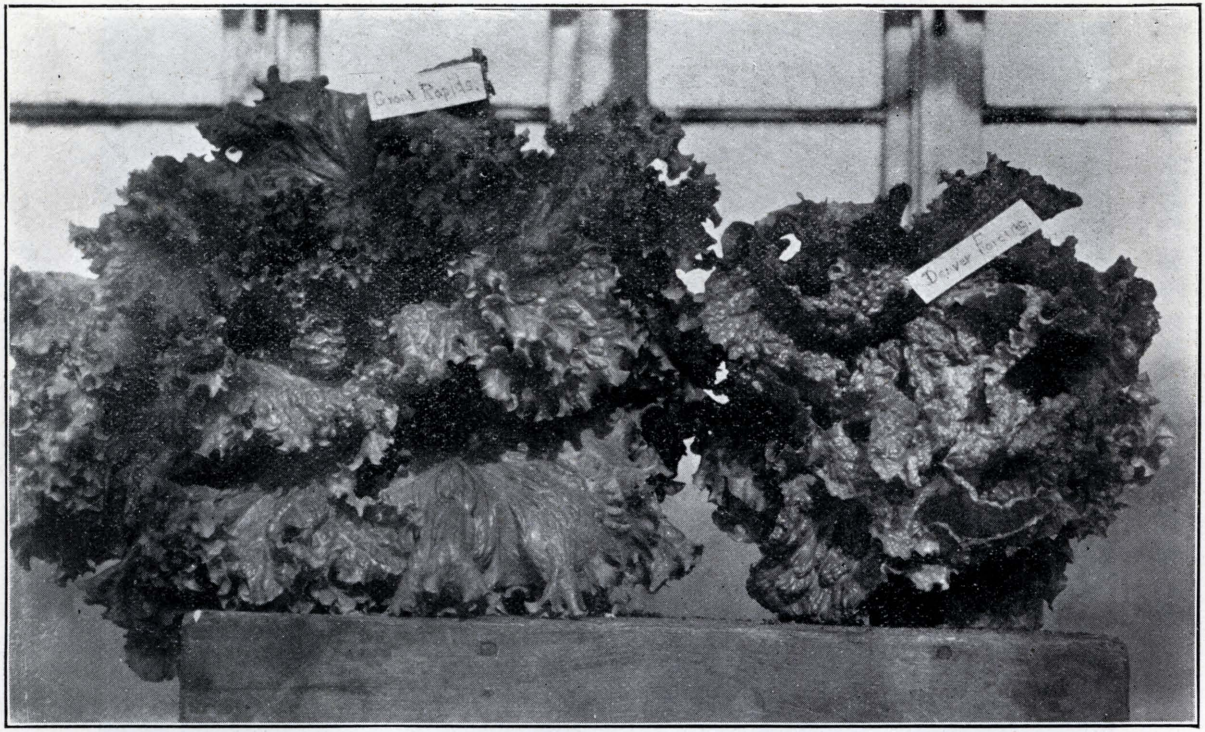
General view of Lettuce Section in the hot house.



Showing relative yields of Grand Rapids and Denver Forcing Lettuce.

FORCING LETTUCE.

C. P. CLOSE.

The winter growing of lettuce is not yet practiced in Utah. There is a good demand for lettuce in Salt Lake City, Ogden, and in some of the smaller towns during the winter, but this demand is supplied by the California grown product. It is yet to be determined whether or not lettuce can be grown profitably under glass in this State. The recent high prices of the winter product indicate that the forcing of a moderate amount of lettuce can be done with profit.

In the season of 1899-1900, the Experiment Station began a series of experiments with lettuce in the forcing house. The facilities for this work were very meager, only one bed five feet by fourteen feet in the center of a small three-quarter span house being available. The work has now been continued two seasons and four crops have been grown.

OBJECT OF THE EXPERIMENT.

The object of the experiment was to compare results from different mixtures of soil, different varieties, and to compare plants of the first day's germination with those of the following day's germination. This last comparison was to determine whether or not the plants which germinated first would mature into larger and heavier plants than would those which germinated one day later. It was desired to work for results that would be of most value to the commercial grower.

PLAN OF EXPERIMENT.

The plan was to continue the work for two seasons, growing two crops each season. The same mixtures of soil, same varieties, etc., were continued throughout the two seasons. A record of the weight and condition of each plant was kept.

VARIETIES.

The Grand Rapids and the Denver Market were the varieties used. The former is a vigorous upright grower, while the latter is more of a head lettuce.

GERMINATION.

The experiment included plants of two dates of germination. Those which appeared the first day of germination are designated "first germination;" those which appeared the following day, "second germination."

SOILS.

Two mixtures of soils were used as follows:

Soil No. 1. { 1 part manure. 1 part sand. 1 part leaf mold.

Soil No. 2. { 1 part manure. 1 part sand. 1 part rotted sod.

The difference between the two mixtures is that one had leaf mold while the other had rotted sod. To the eastern grower, a test of soils so nearly alike would no doubt seem to be of little importance. To the Utah grower the test is of great importance on account of the cost of leaf mold and sod. Leaf mold is more or less plentiful in the mountain canyons and may be had for the hauling. Suitable sod is usually not a product of nature, but of cultivation. This is on account of the arid climate and alkali soil. A florist of Salt Lake City informed the writer that sod suitable for conservatory use costs one dollar per square yard. At other places in the State the cost of sod would certainly be less than at Salt Lake City.

PLAN OF BEDS.

The following plan of the beds shows the arrangement of plants, the kind of germination, and the variety. Every plant in the test was numbered. Each bed contained six test plants of Grand Rapids first germination, and six of second germination; also six test plants of Denver Market first germination, and six second germination. All outside plants and those bounding the different varieties were discarded.

PLAN OF BEDS.

Each dot in the plan represents a plant. The plants which have numbers are test plants. No records were kept of the others since they were put in to equalize the conditions of light and amount of feeding ground of the test plants.

Soil No. 1		Soil No. 2	
Grand Rapids	Denver Market	Grand Rapids	Denver Market
.10 .11 .12	.22 .23 .24	.34 .35 .36	.46 .47 .48
1st Germination	1st Germination	1st Germination	1st Germination
.7 .8 .9	.19 .20 .21	.31 .32 .33	.43 .44 .45
.4 .5 .6	.16 .17 .18	.28 .29 .30	.40 .41 .42
Grand Rapids	Denver Market	Grand Rapids	Denver Market
.1 .2 .3	.13 .14 .15	.25 .26 .27	.37 .38 .39
2nd Germination	2nd Germination	2nd Germination	2nd Germination

SETTING THE PLANTS.

The seed for the first crop was sown in flats October 28th. On November 22nd the plants were set eight inches by nine inches in the beds. At this date the first true leaf was partially developed and the second leaf was just appearing.

TEMPERATURE AND CARE OF BEDS.

The poor arrangement of the ventilators made it difficult to control the temperature of the house when it was affected by the heat of the sun. The temperature desired was fifty-five degrees at night and from sixty-five degrees to seventy degrees during the day time.

In watering and in stirring of the soil, the beds received the usual care given to crops of this kind.

TABLE 1. WEIGHTS OF FIRST CROP, SIX PLANTS IN EACH TEST.

	SOIL NO. 1.		SOIL NO. 2.		
	Grand Rapids. ozs.	Denver Market. ozs.	Grand Rapids. ozs.	Denver Market. ozs.	Total Weights of Germinations. ozs.
1st Germination.....	47	22½	37¾	17¼	124½
2nd Germination	42½	28½	45½	20	136¼
Total Wts. of Varieties..	89½	51	83	37¼	

FIRST CROP. 1899-1900.

The first crop matured in ten weeks from the date of planting. Table 1 gives the weight in ounces of the six plants in each test when cut February 1, 1900.

These results show that soil No. 1 gave heavier total weights with both varieties than did soil No. 2, and also heavier weights in individual tests in every case except one, and second germination of Grand Rapids. The second germination gave heavier weights than the first germination in every test but one, the Grand Rapids on soil No. 1, and also in total weights. The Grand Rapids produced almost twice as heavy a crop as did the Denver Market.

SECOND CROP. 1899–1900.

The second crop was handled in every respect as was the first crop. The same soil was used, but each bed received a dressing of one bushel of well rotted manure which was thoroughly worked into the old soil.

The seed was sown in flats January 16, 1900. The plants had from two to three leaves when they were set in the beds on February 14th. In nine weeks the crop was matured. Table 2 shows the weights of each test of six plants.

TABLE 2. WEIGHTS OF SECOND CROP, SIX PLANTS IN EACH TEST.

	SOIL NO. 1.		SOIL NO. 2		
	Grand Rapids. ozs.	Denver Market. ozs.	Grand Rapids. ozs.	Denver Market. ozs.	Total Weights of Germinations. ozs.
1st Germination.....	38¾	26*	32⅞	32¼	129⅞
2nd Germination.....	34 1/16	41¾	25¼	24⅞	125 5/16
Total Wts. of Varieties..	62 3/16	67¾	58⅛	57⅛	

*26 ounces is the weight of four plants instead of six. Two plants were accidentally injured early in the test and were replaced by others. These did so poorly that to include them would destroy the comparative value of the tests. 13 ounces should be allowed for the two discarded plants.

The weights of the second crop are quite different from those of the first crop. In soil No. 1 the Denver Market crop was five ounces heavier than the Grand Rapids crop. This does not take into consideration the loss of two plants of Denver Market in the first germination test; allowing six and one

half ounces for each plant, the average of the other four, the gain for Denver Market over Grand Rapids is eighteen ounces. In soil No. 2 the total weight of Denver Market is one ounce less than that of Grand Rapids.

The first germination in every test except Denver Market soil No. 1, produced a heavier crop than did the second germination. In total weight of crops it is also ahead of second germination test. Even allowing thirteen ounces for the two plants thrown out of first germination, Denver Market soil No. 1, the weight of this test would still be less than that of the second germination.

Soil No. 1 again produced a heavier crop than soil No. 2.

THIRD CROP. 1900–1901.

New soil was used for the third crop, the mixtures being exactly the same as were used in the first crop.

The seed was sown in flats November 21, 1900, and the plants were set in the beds December 14th. The second leaf was then developing. In ten weeks and two days the crop was ready to be cut. The weights are given in Table 3.

TABLE 3. WEIGHTS OF THIRD CROP, SIX PLANTS IN EACH TEST.

	SOIL NO. 1		SOIL NO. 2		
	Grand Rapids. ozs.	Denver Market. ozs.	Grand Rapids. ozs.	Denver Market. ozs.	Total Weights of Germinations. ozs.
1st Germination.....	38*	42	36	34¾	150¾
2nd Germination	33¾‡	41¼	26¼†	42	134¾
Total Wts. of Varieties..	71¾	83¼	62¼	76¾	

*One plant (7 ounces) discarded that was not Grand Rapids.
† " " (5½ ") " " " " " "
‡ " " (8 ") " " " " " " and one plant injured by drip from melting snow on roof. The loss in weight of this plant was approximately three ounces.

For comparison of tests it is but fair to make an allowance of average weights for discarded plants in Grand Rapids, soil No 1, first and second germinations, in Grand Rapids, soil No. 2, second germination; and for the injured plants in Grand Rapids, soil No. 1, second germination. After doing this the weight of Grand Rapids in soil No. 1 is slightly heavier than the weight of

Denver Market. In soil No. 2 Denver Market gave the heavier weight. The results of first germination were better than those of second germination in three out of four tests, but in total weights the second germination was slightly ahead.

Soil No. 1 again gave much better results than did soil No. 2.

FOURTH CROP. 1900-1901.

Continuing the experiment on the same plan followed the first season, each bed was enriched by an application of one bushel of well rotted manure.

When the plants were large enough to prick out they were put in two-inch pots. From the pots they were transplanted to the beds on March 12th. The crop matured in less than eight weeks from the time the plants were set in the beds. Table 4 gives the weights of the crop when it was cut May 4th.

TABLE 4. WEIGHTS FOURTH CROP, SIX PLANTS IN EACH TEST.

	SOIL NO. 1		SOIL NO. 2		
	Grand Rapids. OZS.	Denver Market. OZS.	Grand Rapids. OZS.	Denver Market. OZS.	Total Weights of Germinations. OZS.
1st Germination.....	42¾	26¼	42¾	22¾	134½
2nd Germination.....	35½	29	43¾	24	132¼
Total Wts. of Varieties..	78¼	55¼	86½	46¾	

The weight of crop from soil No. 1 and from soil No. 2 was practically the same, the former being one-quarter of an ounce heavier than the latter. The Grand Rapids crop was sixty per cent heavier than the Denver Market crop. In three out of four tests the second germination gave better results than did the first germination, but in a total weight of tests the first germination excelled.

RESULTS OF THE FOUR CROPS.

A study of tables 1, 2, 3 and 4 gives the following results of the two seasons' work. As mentioned before in the notes, a fair average weight was allowed for plants discarded in the second and third crops on account of injury and of not being true to name. This was done so that results would be comparable throughout the experiment.

The weight of crops from soil No. 1 was nearly fifteen per cent heavier than the weight of crops from soil No. 2.

The weight of the Grand Rapids crops was nearly forty-seven per cent heavier than was the weight of the Denver Market crops.

The difference in weights of first germination and second germination for all tests is only five ounces in favor of the first germination.

RECOMMENDATIONS.

From the results obtained in four crops the use of leaf mold instead of rotted sod can be recommended. The leaf mold will no doubt be cheaper for Utah growers than will the rotted sod. The Grand Rapids lettuce will be preferable to Denver Market on account of heavier yield, more attractive plants and less liability to tip-burn and rot. The advantage of first germination plants over second germination plants was so slight in these tests that it is not worth considering.